Before the

Federal Communications Commission

Washington, D.C. 20554

Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37, and	)))))	ET Docket No. 14-165
Amendment of Part 74 of the Commission's Rules for Low Power Auxiliary Stations in the Repurposed 600 MHz Band and 600 MHz Duplex Gap	))))	
Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions	)))	GN Docket No. 12-268

Comments of Key Bridge LLC

Key Bridge LLC (formerly "Key Bridge Global LLC", dba "Key Bridge") hereby comments on the various Petitions for Reconsideration filed in connection with the Commission's August 11, 2015 order ("Order") in the above-captioned proceeding.

Key Bridge is a leading provider of safe and neutral shared spectrum services in the television broadcast band. The Key Bridge white space database provides non-discriminatory service to licensed incumbents and unlicensed users, and is trusted by over 150 major broadcast, media, entertainment, utility and wireless service providers throughout the United States and her territories.

1 Unlicensed Channel Registration

Shure requests the Commission reinstate a channel reservation process for unlicensed wireless microphone users. [1] Absent a blanket reinstatement, Shure requests a channel reservation process at a minimum for special circumstances. [2]

The Key Bridge white space database is an information resource used by many licensed and unlicensed wireless microphone users to plan events, conduct frequency coordination, and to register to receive protection from interference. Key Bridge enjoys some visibility into the scale and scope of the operations and economic activities supported by unlicensed wireless microphones and also the substantial capital inventory of unlicensed wireless audio equipment in use throughout the country.

Key Bridge sees no harm in granting Shure's request and concurs the Commission should make some accommodation for unlicensed wireless microphone use in special circumstances. We suggest that the Commission need not develop an exhaustive definition of "special circumstances" but rather may rely on the self-correcting tendencies of the market and on industry to develop an acceptable standard of best practice and acceptable use.

We also suggest that such accommodation need not be indefinite; for with increased density and use it may soon come to pass that the VHF and UHF band becomes congested and increasingly difficult for unlicensed wireless audio. Key Bridge understands that wireless microphone manufacturers are working to extend their capabilities into other unlicensed bands and that such multi-band capabilities will reduce wireless audio user's presently significant dependency on the VHF and UHF bands.

Wireless audio users have proven to be very good neighbors in spectrum sharing. Key Bridge encourages the Commission to consider this and make what accommodations it can for a gradual, economically reasonable transition for unlicensed wireless audio users who until now have enjoyed a safe harbor.

---

1 *Comments of Shure Incorporated*, ET Docket No. 14-165, GN Docket No. 12-268 (filed Feb. 29, 2016) (Shure)
2 Shure at 2.

2 Directional Antenna

In its petition the Wireless Internet Service Providers Association ("WISPA") requests that the Commission permit the TVWS database to incorporate transmit antenna directivity to determine TV channel availability. [3] In its opposition NAB asserts a parade of horrors about the uncertainties of directional antenna including physical installation, unpredictable coverage areas and potential for interference apparently based on wobbly pole mounts, adverse weather and signal reflections off buildings and various other objects. [4] This is hyperbole. NAB further contents that TVWS directional antenna would require periodic on-site inspections to preclude any changes after installation. Also nonsense. TVWS devices have been in service for well-neigh five years now and Key Bridge knows of not a single instance of interference to a broadcast television service.

Key Bridge does concur with NAB that any expansion of the information verified by "professional installation" is not justified. However we do not agree that professional installation should be a prerequisite or dependency for the use of directional antennae, which yield a more efficient use of spectrum and should be encouraged by the Commission.

Key Bridge presently maintains a database and web services API providing detailed information and profiles of over 40,000 directional antennae. [5] Key Bridge also maintains a suite of web service APIs for the calculation of link budgets, signal area coverage, path loss, etc. [6] We note these example services only to demonstrate that the make, model and pointing angle of directional antenna can be easily and automatically registered with a TVWS device and that TVWS regional coverage plus any opportunities for interference with incumbent broadcast services can be readily modeled and predicted with as much or more accuracy and precision as the Commission's own procedures for calculating co-channel interference between two licensed broadcast stations, as will be implemented when repacking stations, for example.

We maintain that registering directional TVWS antenna can be made to work. Key Bridge also

---

3 *Petition for Partial Reconsideration of the Wireless Internet Service Providers Association*, ET Docket No. 14-165, GN Docket No. 12-268 (filed Dec. 23, 2015)

4 *Opposition to Petitions for Reconsideration of the National Association of Broadcasters*, ET Docket No. 14-165, GN Docket No. 12-268 (filed Feb. 29, 2016) (NAB)

5 See Key Bridge Spectrum Data & Databases at http://keybridgeglobal.com/database

6 See Key Bridge Geographic Information Services at http://keybridgeglobal.com/gis

commits to participate in, and lead if necessary, a multi-stakeholder group to work through the details of directional antenna registration and its impact on interference and channel availability calculations, should this be permitted.

3 Professional Installation

Key Bridge concurs with NAB that "professional installation" requirements have failed to ensure the accuracy of information entered into a white spaces database for TVWS devices. Key Bridge further suggests that the Commission's requirement for "professional installation" is *de facto* meaningless, should be abandoned *in toto*, and that all TVWS devices capable of initiating a transmission should be required to incorporate a automatic geolocation capability.

Illustration 1: Cousin Eddy, a "professional installer".

We note for example that there is no professional installer requirement to assemble a 18m satellite earth station, which in the author's experience can kill trees and any unlucky avian wildlife nesting in those trees with their high-power output. There is likewise no professional guild or official guideline for TWVS professional installers. The past several year's experience has shown the Commission's "professional installation" requirement to be hollow and unachievable.

Fortunately there is a ready option that renders professional installation unnecessary: automatic geolocation. NAB does not object to eliminating the professional installation requirement for

TVWS devices provided that those devices include a geolocation capability. [7] On this topic Key Bridge agrees with NAB, Microsoft, et. al. that requiring all TVWS devices to include built-in geolocation capability, as is now required only for personal/portable devices, would eliminate the need for professional installation. [8, 9]

Key Bridge suggests the Commission should cut this Gordian knot and eliminate entirely the unworkable requirement to employ a "professional installer" by instead mandating that all TVWS devices include a build-in geolocation capability.

Requiring automatic geolocation capability for all TVWS devices will not impose a meaningful cost or technology burden on TVWS manufacturers and users. GPS modules are mature, easy to use, readily available and remarkably cheap; complete electronics kits routinely sell for less than $10 retail.

Illustration 2: GPS hardware modules retail for as low as $10

There exist literally billions of radio devices such as smart phones and Internet-of-things sensors, as examples, that presently include automatic geolocation capability. The Commission should not be swayed by patently weak arguments that implementing automatic geolocation in TVWS devices would be difficult, expensive or would somehow harm adoption.

---

7 NAB at 7.
8 NAB at 5.
9 *Petition for Reconsideration and Clarification of Microsoft Corporation*, ET Docket No. 14-165, GN Docket No. 12-268, 2, 16 (filed Dec. 23, 2015)

4 TVWS Device Management

Key Bridge strongly disagrees with any contention that implementing a push capability for TVWS devices and databases is impractical. [10, 11, 12] Key Bridge suggests that just the opposite is true.

Automatic device configuration and management is a problem solved many times over in other domains. Examples of standard implementations for automatic device configuration with PUSH capability include *OMA Device Management* maintained by the Open Mobile Alliance, *J2EE Mobile Device Management* maintained by the Java user community, *CPE WAN Management Protocol* (CWMP) maintained by the the Broadband Forum, etc.

Objections to revision and improvement of TVWS management obligations by Google, the White Space Database Group, NAB, et al. have no technical merit and reflect merely those party's inertia and lack of initiative. The Commission's requirement to implement push notifications is sound, should be upheld, and the Commission should reject as baseless the claims by Google, the White Space Database Group, NAB, et al. that management of TVWS devices is somehow uniquely difficult.

Regrettably and astoundingly, automatic device configuration was not implemented in the first round of TVWS and database experimentation and implementation. It is high time this deficiency is corrected. A more actively manage TVWS that includes push notifications will however require a review of current device communications protocols, which were invented very early and never fully developed to their potential.

Any such review should be undertaken by a new industry multi-stakeholder group, as is proving so successful in the 3.5 GHz band. [13] Key Bridge presently chairs one such multi-stakeholder group formed to develop the details of automatic configuration for CBRS devices. We commit to participate in, and lead if necessary, TVWS multi-stakeholder activities the Commission may call

---

10 NAB at 8.

11 *Google Inc. Petition for Reconsideration*, ET Docket No. 14-165, GN Docket No. 12-268, 7-8 (filed Dec. 23, 2015)

12 *TV Whitespace Database Administrators Group Comment*, GN Docket 12-268 (filed 12/23/2015)

13 Amendment to the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, *Report and Order and Second Further Notice of Proposed Rulemaking*, GN Docket 12-354, (FCC 15-47) Adopted Apr. 17, 2015. In its report and order the Commission calls upon industry to establish various standardized processes, protocols and procedures through multi-stakeholder groups.

on Industry to initiate.

5 Conclusion

Key Bridge appreciates the opportunity to comment in this proceeding. We hope that the Commission will find our contribution helpful and constructive.

Respectfully submitted,

/s/

Jesse Caulfield, CEO
Key Bridge LLC
1600 Tysons Blvd., Suite 1100
McLean, VA 22102

Phone: (703) 414-3500
Fax: (703) 414-3501